

DIRECTION-SWITCHING STRUCTURE FOR A RATCHETING WRENCH

A direction-switching structure for a ratcheting wrench includes a resilient plate that can be moved to cause a change in the direction of a ratchet wheel. The switch member is located in an intermediate portion of the wrench, allowing easy leftward/rightward turning by a single hand.

Typical conventional are illustrated in Figs. 6 and 7, wherein the switch member (A), (B) for changing the engaging direction is located in a front end of the wrench (C). In operation, a hand of the user holds the wrench (C) and the other hand of the user proceeds with a change in the clockwise or counterclockwise rotation. However, such an operation requiring both hands is inconvenient when in a difficult-to-operate state or when the other hand has to hold other objects or to support the body. This is because the switch member (A), (B) is too far away from the holding position and thus could not allow operation by a single hand. If operating with a single hand, the hand must move forward to the switch member (A) and then moves back to the holding position after switching, which is inconvenient. Further, these conventional wrenches (C) are generally a rod and thus fail to provide an aesthetic appearance. Further, the rod is formed by costly and weighty metal. Of more importance, these conventional wrenches have a relatively large friction between the ratchet wheel and the pawl. As a result, the wrench functions well when loosening a nut or screw tightly engaged with a bolt or screw hole. However, when the nut or screw is slightly loosened to an extent that the nut or screw still cannot be loosened by hand, the nut or screw turns together with the wrench (C) when the wrench (C) is turned; namely, the nut or screw turns in a direction and then in a reverse direction without any loosening effect, which causes a problem to turning, not to mention the utility need.

In view of the disadvantages and drawbacks in use of the above-mentioned conventional ratcheting wrenches, the present inventor had conducted research and development, and an application serial number 75211059 entitled

“improved structure for a ratcheting wrench” has been filed on November 21, 1986 and granted (published as publication no. 36664). This wrench greatly mitigates the drawbacks of the conventional ratcheting wrenches, allows easy grip by the user, allows operation by a single hand, and provides reliable direction switching. Thus, the wrench is popular among consumers. Nevertheless, the present inventor is not satisfied with this and continues his research and development in seeking more advanced ratcheting wrench. After continuous improvement, a direction-switching structure for a ratcheting wrench is obtained.

Namely, the main object of the present invention is to provide a direction-switching structure for a ratcheting wrench, which simplifies the structure, allows easy assembly, and cuts the cost while having the advantages of the original design. Of more importance, the direction switching is more reliable and reliable operation is easier.

In order to achieve the above-mentioned objects, the elements for controlling the direction switching of the present invention are totally different from the prior art in structure and in principle, which is the main reason for filing the present application as an independent application. The present invention provides a retaining block pivotally mounted in an intermediate portion of an elongated groove of the body. The retaining block is engaged with a switch member that extends downwardly through an upper plate and that has an engaging member. A cut groove is defined in each of a front end of the retaining block and a rear end of the pawl. A plate-like resilient plate having a length slightly greater than the rectilinear distance between the two cut grooves is engaged in the cut grooves such that the operational direction of the ratchet wheel can be controlled by means of turning the switch member leftward/rightward above the upper plate.

To assist the Examiner in understanding the features of the present invention in detail, the structure, functions, purposes, and operation of the present invention will be described with reference to the accompanying drawings.

Drawings:

Fig. 1 is an exploded perspective view of the present invention.

Fig. 2 is an enlarged view showing the other side of a retaining block of the present invention.

Fig. 3 is a view showing engagement of the retaining block and a switch button of the present invention.

5 Fig. 4 is a view of the present invention after assembly.

Fig. 5 is another view of the present invention after assembly.

Fig. 6 shows a conventional ratcheting wrench.

Fig. 7 shows another conventional ratcheting wrench.

Numerals:

- 10 (10) body (11) through-compartment (12) through-hole
 (121) fixing screw (13) elongated groove (14) engaging hole
 (2) upper plate (21) through-hole (22) circular hole
 (3) lower plate (31) through-hole (4) ratchet wheel
 (5) pawl (51) cut groove (6) retaining block
 15 (61) countersink (62) axle (63) square groove
 (64) cut groove (65) stop (7) switch member
 (71) engaging member (72) turn piece (8) resilient plate
 (A), (B) switch member (C) wrench

20 Referring to Figs. 1-3, the present invention is consisted of a body (1), an upper plate (2), a lower plate (3), a ratchet wheel (4), a pawl (5), a retaining block (6), a switch member (7), and a resilient plate (8). An end of the body (1) includes a through-compartment (11) for receiving the ratchet wheel (4) and the pawl (5). The upper and lower plates (2) and (3) include through-holes (21) and (31), with
 25 two ends of the ratchet wheel extending through the through-holes, thereby retaining the ratchet wheel in place. A through-hole (12) is defined in each of two sides of the through-compartment (11) and in each of the upper and lower plates (2) and (3), and fixing screws (121) are extended through the through-holes (12), thereby mounting the upper and lower plates (2) and (3) to the body (1), with the
 30 upper and lower plates (2) and (3) being respectively flush with two sides of the body (1), and with the pawl (5) being positioned in the through-compartment (11).

The present invention mainly comprises an engaging hole (14) in an intermediate portion of an elongated groove (13) of the body (1). The retaining block (6) includes a countersink (61) in each of an upper end and a lower end thereof. Protruding from a center of a lower end of the retaining block (6) is an axle (62) that is engaged in the engaging hole (14). Two square grooves (63) are respectively formed on two sides of the axle (62) and extend through the countersinks (61). A cut groove (64) is defined in a front end of the retaining block, and a stop (65) extends from a rear end of the retaining block. Further, the upper plate (2) includes a circular hole (22), allowing the switch member (7) to be engaged with the retaining block (6). An engaging member (71) is formed on a lower end of the switch member and securely engaged in the square grooves (63) after passing through the square grooves (63). A turn piece (72) extends rearward from an upper end of the switch member (7). A plate-like resilient plate (8) has an end engaged in the cut groove (64) in the front end of the retaining groove (6), with the other end of the resilient plate (8) being engaged in the cut groove (51) in the rear end of the pawl (5).

After assembly, as shown in Figs. 4 and 5, the switch member (7) and the retaining block (6) are engaged together as a single member. The retaining member (6) may turn about the axle (62), and the pawl (5) may turn about the fixing screw (121). Thus, when the turn piece (72) of the switch member (7) is turned, the resilient plate (8) engaged between the cut grooves (64) and (51) moves. Since the length of the resilient plate (8) is slightly greater than the distance between the cut grooves (64) and (51), the resilient plate (8) is normally bent, imparting a supporting force to the pawl (5) and thus causing a side of the pawl (5) to mesh with the ratchet wheel (4). When the turn piece (72) is turned, the resilient plate (8) will move to the other side and thus bend after passing through the middle point, providing an excellent positioning effect and excellent meshing with the ratchet wheel (4). The ratchet wheel (4) in Fig. 4 can only turn clockwise, and the ratchet wheel (4) in Fig. 5 can only turn counterclockwise. In addition to excellent positioning and reliable support by the resilient plate (8) mentioned above, the direction can be easily switched by the hand that applies

force to the wrench, and the switching is achieved by a number of retaining elements that have a simple structure, which is not easy to obtain.

5 In particular, the stop (65) extending from the rear end of the retaining block (6) is used to prevent excessive rotation of the turn piece (72). A gap exists between the stop (65) and the elongated groove (13) of the body (1). However, after switching is completed, excessive force causes the stop (65) to contact an inner edge of the body (1). Thus, no further force can be applied. This provides a safety to prevent improper force application.

10 According to the above description, the present invention provides a direction-switching operation by a single hand. The structure is effectively constructed in a simplified manner while providing an excellent retaining effect. It possesses utility and improvement in comparison with prior art. An application for patent is filed accordingly.

Claims (originally filed):

1. A direction-switch structure for a ratcheting wrench, comprising an upper plate and a lower plate that are engaged to a body by fixing screws, a ratchet wheel and a pawl being positioned in a through-compartment in an end of the body, characterized in that:

a retaining block is pivotally mounted in an intermediate portion of an elongated groove of the body, the retaining block is engaged with a switch member that extends through the upper plate, the retaining block has a cut groove in a front end thereof, a stop extends from a rear end of the retaining block, a plate-like resilient plate is engaged between a cut groove in a rear end of the pawl and the cut groove of the retaining block and has a length slightly greater than a rectilinear distance between the two cut grooves, a turn piece extends from a rear end of the switch member for manual optional turning with a single hand.

2. The direction-switch structure for a ratcheting wrench as claimed in claim 1, wherein the pivotal mounting between the retaining block and the body includes an axle formed on a lower end of the retaining block and the elongated groove of the body includes an engaging hole for pivotally receiving the axle, or the lower end of the retaining block has an engaging hole and the body includes an axle pivotally received in the engaging hole.

3. The direction-switch structure for a ratcheting wrench as claimed in claim 1 or 2, wherein the engagement between the retaining block and the switch member includes a countersink in each of an upper end and a lower end of the retaining block, two square grooves are respectively formed on two sides of the axle, the lower end of the switch member include an engaging member that is retained in the square grooves after passing through the square grooves.

Amended claims of Patent Application No. 77209984 entitled "DIRECTION-SWITCHIGN STRUCTURE FOR A RATCHETING WRENCH":

1. A direction-switch structure for a ratcheting wrench, comprising an upper plate and a lower plate that are engaged to a body by fixing screws, a
5 ratchet wheel and a pawl being positioned in a through-compartment in an end of the body, wherein a retaining block is pivotally mounted in an intermediate portion of an elongated groove of the body, a plate-like resilient plate is engaged between a cut groove in a rear end of the pawl and a cut groove of the retaining block and has a length slightly greater than a rectilinear distance between the two
10 cut grooves, characterized in that:

the retaining block is engaged with a switch member that extends through the upper plate, the retaining block has a cut groove in a front end thereof, a stop extends from a rear end of the retaining block, a turn piece extends from a rear end of the switch member for manual optional turning with a single hand.

15 2. The direction-switch structure for a ratcheting wrench as claimed in claim 1, wherein the engagement between the retaining block and the switch member includes a countersink in each of an upper end and a lower end of the retaining block, two square grooves are respectively formed on two sides of the axle, the lower end of the switch member includes an engaging member that is
20 retained in the square grooves after passing through the square grooves.

Abstract

The present invention relates to a direction-switch structure for a ratcheting wrench, and, in particular, to a structure including an upper plate and a lower plate that are engaged to a body by fixing screws, thereby positioning a ratchet wheel and a pawl in an end of the body. A retaining block is pivotally mounted in an intermediate portion of an elongated groove of the body. A countersink is defined in each of an upper end and a lower end of the retaining block. The retaining block has a cut groove in a front end thereof. A stop extends from a rear end of the retaining block. Two square grooves are respectively formed on two sides of an axle on a lower end of the retaining block. An engaging member is formed on a lower end of the switch member and extends through the upper plate for engaging with the square holes. A plate-like resilient plate has two ends respectively engaged in a cut groove of the retaining block and a cut groove in the ratchet wheel. When the switch member is turned, the direction of the ratchet wheel is changed.

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Cited Ref. 2

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公告本

(以上各欄由本局填註)

發明專利說明書

一、發明名稱 棘輪扳手之轉向調整結構

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77. 12. 20

之名稱，棘輪扳手之轉向調整結構
新型


四、摘要：(應以簡明之文字敘述其中請專利內容之特點)
創作

本創作係關於一種棘輪扳手之轉向調整結構，尤指一種以上下片體藉定位螺絲與本體結合而將棘輪與棘輪掣塊定位於本體一端，而本體長槽中段則橫設一制動塊，該制動塊上下端均設為魚眼孔，且中央轉柱兩側設貫穿之槽孔，供一穿出上片體之按鈕下端扣筭定位嵌結，且該制動塊前端設剖槽並於後端伸出阻緣；令一板片狀之彈簧片兩端分別嵌夾於制動塊與棘輪掣塊之剖槽，於旋轉按鈕時即可調整棘輪之轉換方向者。

附註：本案已向

國(地區)申請專利，申請日期：

案號：

五、說明(本欄應載明有關之先前技術，發明或創作之目的，技術內容、特點及功效，
創作使熟習該項技術者能了解其內容並可據以實施)

一種棘輪扳手之轉換向調整結構，係以彈簧片之被撥移，造成棘輪之換向，而此一按鈕係位於扳手之中段，可利於單手操作，只需左、右撥動即可者。

目前常見之棘輪扳手如第六、七圖所示，其卡掣換向之變換鈕(A)(B)皆設於扳手(C)之前端，而在操作時以一手握

持扳手(C)，另一手配合變換正、反轉，惟此種雙手作業在不良地形操作狀況或另手必須握持其他東西及支撐身體時則殊感不便，蓋，變換鈕(A)、(B)皆離握持位置太遠而無法單手操作（因若單手操作，必需將手前移至變換鈕(A)處，變換後再退回原握持部位，造成不便。）；又此種舊用扳手(C)皆形成一圓棒狀，形狀實難達美觀之要求，尙且其皆以金屬材質成型不但材料昂貴，而且亦較笨重；尤其重要的是此兩種舊用扳手，其棘輪與棘輪壁之卡定摩擦阻力甚大，故吾人可常見的是其在鬆脫尙與螺絲或螺孔緊密嵌合之棘輪或棘釘時尙堪稱實用，惟在棘輪或棘釘已初步鬆動狀態時，當然此時仍非以手即可旋鬆狀態，當旋動扳手(C)再行後退時即產生套齒帶動棘輪或棘釘亦同時跟隨後退，即產生旋去又旋回空轉之情況，此對於旋扳時造成甚大困難，更遑論實用之要求了。

本創作人即鑑於前述舊用棘輪扳手之不理想和使用上缺失，乃積極研創，並於75年11月21日提起申請，為第七五二一一〇五九號「棘輪扳手之改良結構」，該案已核准公告並獲頒證書（第三六六六四號），且其更大大改善了舊用缺點，使操作者易於握持且轉換方向可單手操控自如，加上換向確實有效而普遍消費者歡迎，然而創作人並不以此自滿，仍致力研究、開發更優秀之棘輪扳手，經不斷改良，終完成一種棘輪扳手之轉向調整結構。

即，本創作之主要目的，在提供一種棘輪扳手之轉向調整結構，除具有原設計之優點之外，更在結構上予以簡

化使組裝更方便、成本更為降低，更重要的是令換向更為落實有效，操控得心應手。

緣為達成前述的目的，是以本創作於控制換向之元件上採完全與前案不同之結構及原理，而此亦即本案申請為獨立案之最大原因者；本案係於本經長槽中段樞設一觸動塊，該制動塊則可提供一由上片體下穿且具扣筍之撥鈕嵌固，而制動塊前端及棘輪擊塊後端均具斜槽，可嵌夾一略長於此兩槽槽直綫距離之板片狀彈簧片，提供撥鈕於上片體上方左、右撥動即可控制棘輪之作動方向者。

為便於貴審查委員能更深入了解本創作之特徵，茲作以圖式，詳細說明本創作之結構、功能、目的及操作情形如下：

(一)圖式部份：

第一圖係本創作之立體系統分解圖。

第二圖係本創作之觸動塊另面結構放大示意圖。

第三圖係本創作之觸動塊與撥鈕結合示意圖。

第四圖係本創作之組合示意圖(一)。

第五圖係本創作之組合示意圖(二)。

第六圖係習用棘輪扳手(一)。

第七圖係習用棘輪扳手(二)。

(二)圖號部份：

(1)本體

(11)貫穿槽

(12)貫穿孔

(121)定位螺絲

(13)長槽

(14)套孔

(2)上片體

(21)穿孔

(22)圓孔

- | | | |
|-------------|---------|---------|
| (3) 下片體 | (31) 穿孔 | (4) 棘輪 |
| (5) 棘輪掣塊 | (51) 剖槽 | (6) 制動塊 |
| (61) 魚眼孔 | (62) 轉軸 | (63) 方槽 |
| (64) 剖槽 | (65) 阻緣 | (7) 撥鈕 |
| (71) 扣筍 | (72) 撥桿 | (8) 彈簧片 |
| (A)、(B) 變換鈕 | (C) 扳手 | |

請參閱第一～三圖，本創作概由本體(1)、上片體(2)、下片體(3)、棘輪(4)、棘輪掣塊(5)、制動塊(6)、撥鈕(7)及彈簧片(8)等構件組成；其中本體(1)於一端形成供容置棘輪(4)及棘輪掣塊(5)之貫穿槽(11)，並於上、下片體(2)、(3)設穿孔(21)、(31)供棘輪兩端穿過而定位，而本體(1)貫穿槽(11)中央兩側與相對於棘輪掣塊(5)及後端適當位置，配合上、下片體(2)、(3)均設有貫穿孔(12)，供以定位螺絲(121)將上、下片體(2)、(3)結合於本體(1)端面齊平，且定位棘輪掣塊(5)於貫穿槽(11)內；本創作主要則係於本體(1)長槽(13)中設設一套孔(14)，而一制動塊(6)上、下端均設魚眼孔(61)，且下端中央凸伸一轉軸(62)套設於套孔(14)，而兩魚眼孔(61)間於轉軸(62)兩側設貫穿之方槽(63)，並於塊體前端設剖槽(64)，及在後端延伸出阻緣(65)；此外上片體(2)相對於此具一圓孔(22)，供撥鈕(7)與制動塊(6)結合，該撥鈕下端形成有扣筍(71)穿入方槽(63)鉤扣固定，上端向把手後方延伸撥桿(72)；一板片狀彈簧片(8)一端為制動塊(6)前端剖槽(64)嵌夾，另端則為棘輪掣塊(5)後端剖槽(51)嵌夾。

因之，當組合後參閱第四、五圖所示，按鈕(7)與制動塊(6)結合為一體，而制動塊(6)以轉軸(52)為活動軸，配合定位棘輪單塊(5)之定位螺絲(121)為軸，使分別為兩部槽(54、51)嵌夾端部之彈簧片(8)在按鈕(7)之撥桿(72)撥動時產生偏移，而因為彈簧片(8)之長度稍長於兩部槽(54、51)間之距離，故在常態下其乃產生向一個弧張微彎之態勢，造成對棘輪單塊(5)之一股推力，使其恆以一個與棘輪(4)啮合，而在撥動撥桿(72)時，只要彈簧片(8)一過中間點後必定向另個弧張，達到良好之定位效果及咬合棘輪(4)功效；如第四圖可見棘輪(4)只能順時針轉，而第五圖則只能逆時針轉；當然本創作之特色除前述定位確實，彈簧片(8)彈力可靠，更因其可以施力之手輕易換向撥動，且只藉結構單純之若干制動構件即可完成，實屬難得。

特別是制動塊(6)後端延伸之阻緣(5)，主要是防止撥桿(72)之過度旋扳，其與本體(1)長槽(13)間尚有一裕度，惟若已換向完成再繼續施力過度時將會碰觸到本體(1)內緣，而無法繼續施力，供為一安全之措施，防止不當之施力者。

綜上所述，本創作能提供單手選撥換向，更以其簡單有效之構設，造成良好之制動效果，確係如前述其實用性與進步性當較之舊用者更增進功效，爰依法提起申請

130638

第七七二〇九九八四號「棘輪扳手之轉向調整結構」申請
專利範圍修正本

六申請專利範圍：

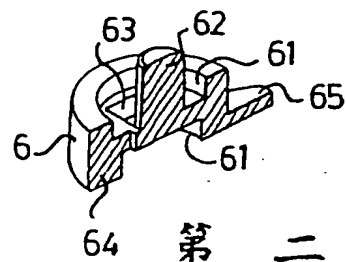
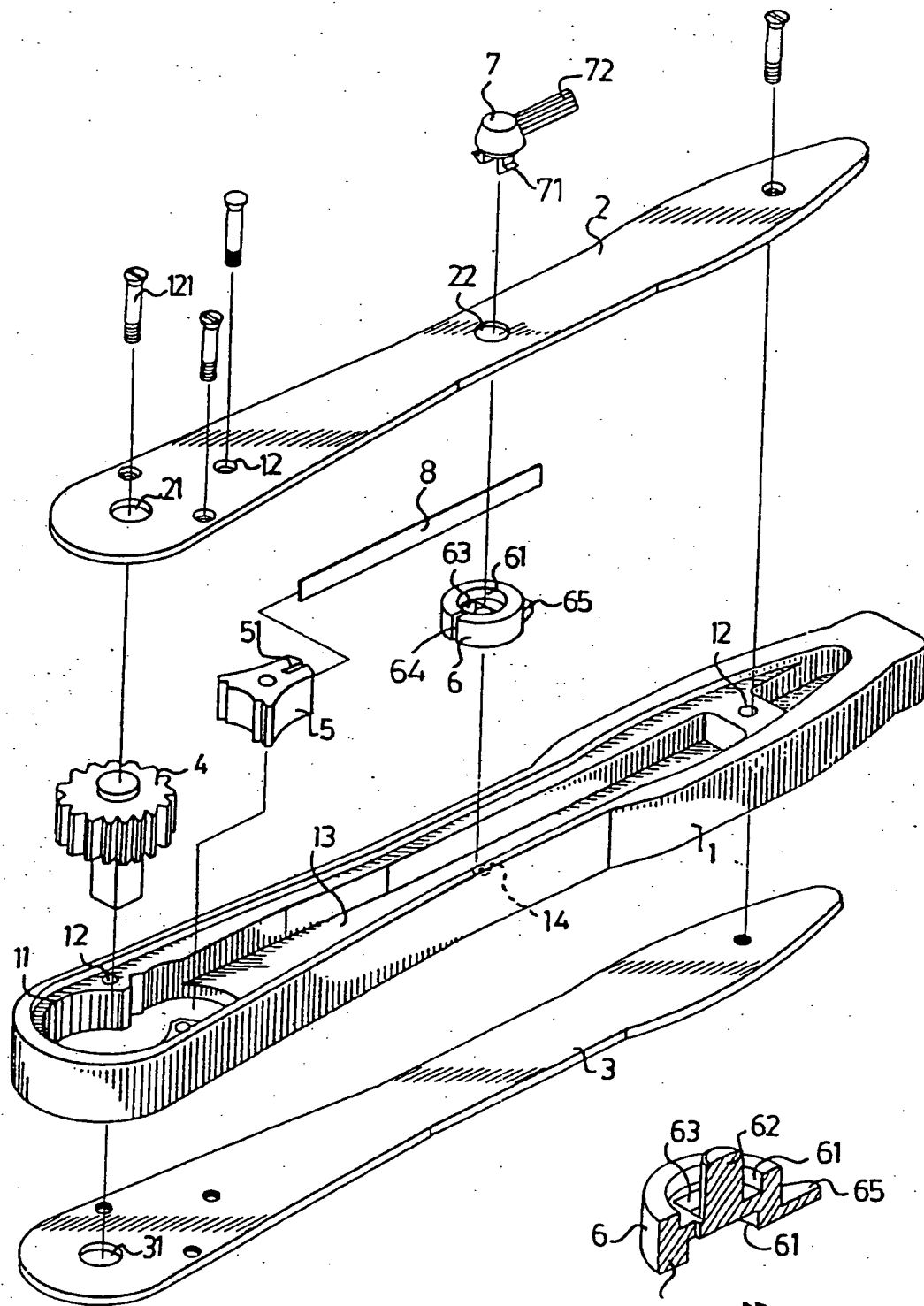
修正
補
87.10.27

1. 一種棘輪扳手之轉向調整結構，係藉上、下片體以定位螺絲與本體結合，並將棘輪及棘輪掣塊定位於本體一端貫穿槽內，其中，本體長槽中段樞設一制動塊，而於棘輪掣塊後端剖槽與制動塊剖槽間嵌夾一長度略長於兩剖槽直綫距離之板片狀彈簧片，其特徵在於：該制動塊與一穿入上片體之撥鈕嵌定，且於前端設剖槽，並於後端延伸出阻緣，藉於撥鈕後端延伸出一撥桿，而可單手隨意轉向者。

2. 如申請專利範圍第1項所述之棘輪扳手之轉向調整結構，其中制動塊與撥鈕之嵌固方式，係將制動塊上下端均形成魚眼孔，而下端轉軸兩側具貫穿之方槽，該撥鈕下端則形成扣筭供穿過方槽後鈎扣固定者。

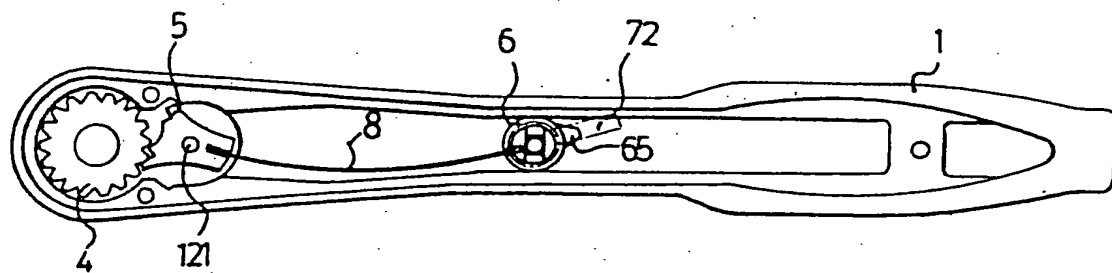
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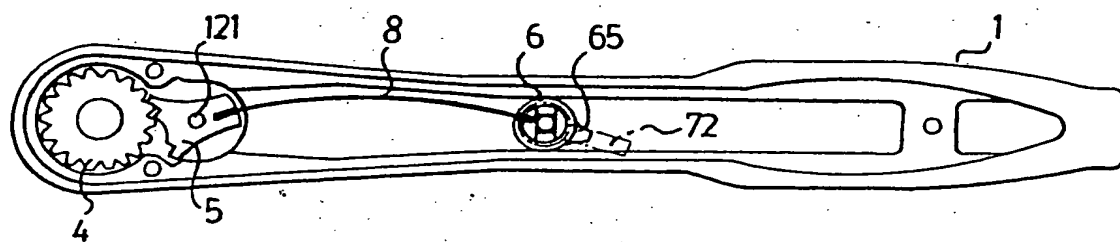


第二圖

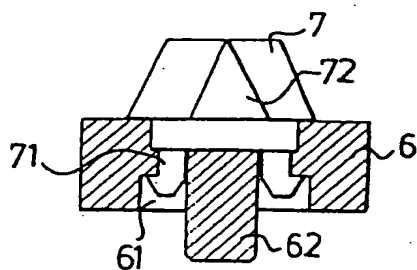
第一圖



第四圖

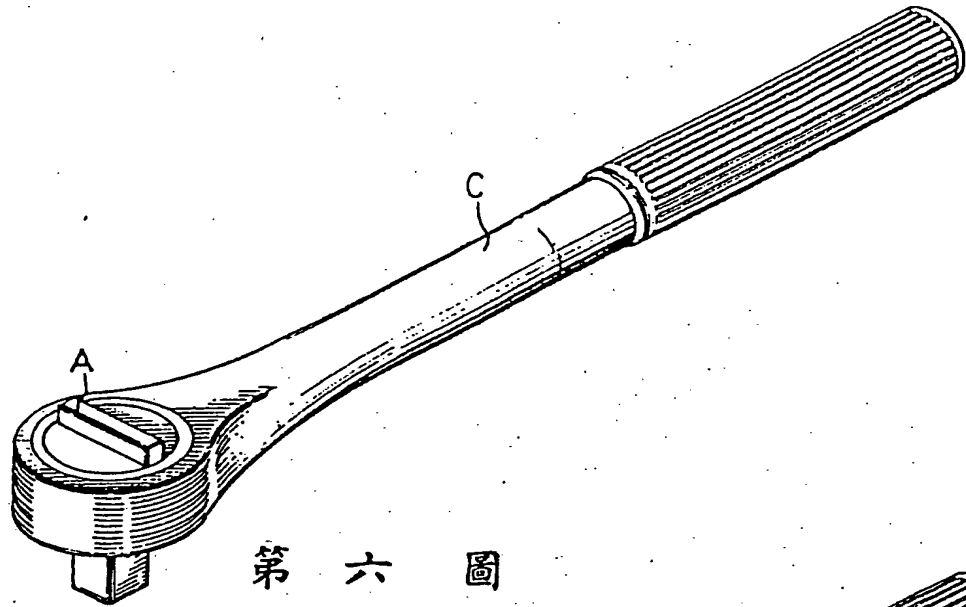


第五圖

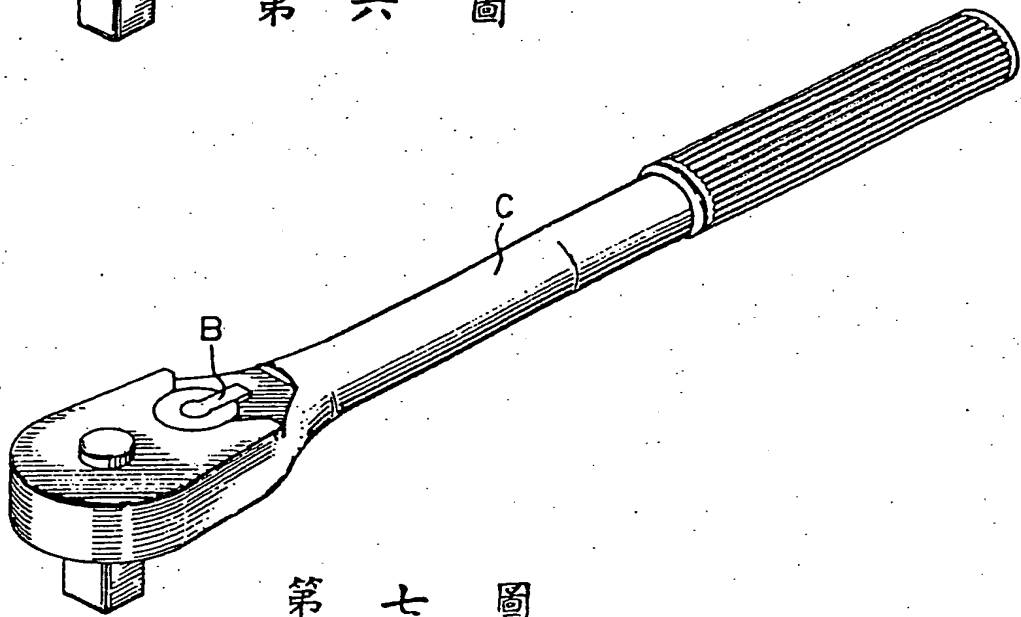


第三圖

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第 六 圖



第 七 圖